

Amendments to the Drawing Figures:

In Figure 3, an arrow has been added to direct the reference number 28 to the vision system, and the line directed incorrectly has been removed. Also, an arrow has been added to direct the reference number 12 to the laser 12, and the arrow from the reference number 14 to the laser 12 has been removed. Finally, the reference number 16 and the related arrows have been removed.

In Figure 4, the reference number 10' directed to the camera 11 has been corrected.

In Figure 7, the reference numbers to the three other balls 22' have been added.

In Figure 8, the reference numbers to the four balls 22' have been added, as well as the reference number for the circuit board 23'.

In Figure 10, the reference number 10' for the sensor has been corrected to 10.

In Figure 11, an arrow has been directed from the reference number 13 to the object plane 13.

Attachments: Six (6) replacement drawing sheets

REMARKS

In the Office Action dated December 29, 2004, the Examiner rejects claims 27, 33 and 40 under 35 U.S.C. § 112, second paragraph, and rejects claims 17-41 under 35 U.S.C. § 103(a). With this Amendment, claims 20, 23 and 36 are amended. No claims are added or canceled. It is respectfully submitted that the claims are clear and definite and are not invalid in view of the prior art. Reconsideration of the application as amended is respectfully requested.

Applicant has reviewed the specification and abstract and has found numerous typographical and/or grammatical errors. Attached herewith is a Substitute Specification including the changes proposed by the Applicant. Applicant has also attached a redline/strikeout version showing the changes to specification as currently pending as compared to the Substitute Specification. It is respectfully submitted that none of these changes add new matter to the Application as originally filed. Entry of the Substitute Specification is respectfully requested.

With this Amendment, Applicant has also corrected a number of minor errors in the drawing figures as described above. It is respectfully submitted that the proposed changes add no new matter to the Application as originally filed, but instead conform the drawing figures to each other and to the specification. The Examiner's approval of the proposed replacement drawing figures is respectfully requested.

Applicant has also amended claim 23 to clarify the antecedent basis for the coplanarity value described therein and has amended claim 36 to correct a typographical error.

The Examiner rejects claims 27, 33 and 40 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Specifically, the Examiner objects to Applicant's use of the term "three dimensional image" in each of these claims to mean "three dimensional profile," which the Examiner states is contrary to the accepted meaning of an image giving the illusion of depth or varying distances. The Examiner states that the specification refers to "3D profiles" as profiles representative of altitude data as seen in Fig. 6. Finally, the

Examiner states that these are not three dimensional images as defined by its ordinary meaning and that Applicant has not redefined the term.

It is respectfully submitted that Applicant has described a three dimensional image in the specification. Specifically, in paragraph [0031], Applicant defines a three dimensional image and contrasts it with a two dimensional image:

a three dimensional image is made up of a data set which includes data points defined by an address having three components, x, y, and z wherein a two dimensional image is made up of a data set defined by data points defined by an address having two components, x, and y. Viewed in terms of the present system a three dimensional data set includes a height or z axis component, while a two dimensional data set represents the appearance of an object as viewed from above.

Similarly, claim 17, from which claim 27 depends, and claim 30, from which claim 33 depends and claim 36, from which claim 40 depends, states that "the three dimensional image [is] defined by a plurality of pixels having at least an address and an altitude." Nothing in claims 27, 33 or 40 contradicts these definitions and makes the claims indefinite. Applicant respectfully requests reconsideration.

The Examiner rejects claims 17-19, 21 and 22 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. (EP 0471196) in view of Paulsen et al. (US 6,522,777) and Haugan et al. (US 6,118,538). The Examiner states that Mengel et al. teaches all of the features of claim 17 and its dependent claims except for the features of two and three dimensional images defined by a plurality of pixels and rejecting an IC package. The Examiner further states that Paulsen et al. teaches two and three dimensional images defined by a plurality of pixels and that it would have been obvious to one skilled in the art to incorporate the method of Mengel et al. with the images with pixels of Paulsen et al. since such a modification would increase resolution for better images (Fig. 21) as implied from Paulsen et al. The Examiner adds that Haugan et al. teaches rejecting an IC package and that it would have been obvious to one skilled in the art to incorporate the method of Mengel et al. with the rejecting of an IC package of Haugan et al. since the modification would improve quality (col. 5, lines 1-5) as implied from Haugan et al.

This rejection is respectfully traversed. It is respectfully submitted that Mengel et al. fails to teach or suggest the step of claim 17 of processing the three

dimensional image only at those addresses which correspond to two dimensional addresses characteristic of three dimensional features, to determine the altitude of those three dimensional features. Mengel et al. teaches simultaneous processing of a two dimensional image and a three dimensional image. In fact, this is the core teaching of Mengel et al. as discussed therein:

The invention is based on the recognition that the recognition certainty in image analysis whose image taking is based on triangulation and that makes a classification using extracted image features, can be substantially increased by the simultaneous processing of image features from the grayscale image. [I]n addition to the image features from the height image a certain number of image features is additionally extracted from the grayscale image and the sum of all image features used to classify an image. In this manner certain parts of a test piece that cannot be unambiguously identified from the recorded height image can be derived by means of the additional image features can be evaluated. (Pg. 3, ll. 7-15).

See also claim 1 (“for each image point to be processed the corresponding values of the height image and of the grayscale image *simultaneously* enter into the extraction of the image features”) (emphasis added). Like the two dimensional image, the three dimensional image is processed at all addresses and not only those addresses that correspond to two dimensional addresses characteristic of three dimensional features as described in Applicant’s claim 17.

Further, “the two-dimensional statements from the grayscale image that were additionally recorded at the same time [as the three-dimensional images] and also processed at the same time [as the three-dimensional images]” are not used for determining the altitude of the three-dimensional images in Mengel et al. Instead, the two-dimensional images are used to filter out erroneous information in the recorded measurement data of the three-dimensional image that would otherwise represent (correctly or incorrectly) a uniform height or a different surface structure. (Pg. 4, line 32 to pg. 5, line 1).

For the foregoing reasons, Mengel et al. fails to teach or suggest all of the features of claim 17 and its dependent claims. The addition of either Paulsen et al., Haugan et al. or both, fails to cure this deficiency because neither teaches or suggests the step of claim 17 of processing the three dimensional image only at those addresses which correspond to two dimensional addresses characteristic of three

dimensional features, to determine the altitude of those three dimensional features. Consequently, even if the combination were taught or suggested by the prior art, which Applicant respectfully submits it is not, the combination would still fail to teach or suggest the invention of claim 17. Claim 17 and its dependent claims are allowable over the prior art of record.

In addition to the foregoing, it is respectfully submitted that the cited combination fails to teach or suggest all the features of claim 22, which depends from indirectly from independent claim 17. The Examiner states that Paulsen et al. teaches the feature of inspecting coplanarity and that it would have been obvious to one skilled in the art to incorporate the method of Mengel et al. with this feature of Paulsen et al. since the modification would improve quality of the product and fix manufacturing problems (Abstract, lines 1-6) as implied from Paulsen et al.

Initially, it is submitted that the Examiner has mischaracterized the teachings of Applicant's invention. Claim 22 and its dependent claims 23 and 24 includes the feature wherein the IC package is rejected if the coplanarity value of a collection of three dimensional features is greater than a predetermined value. It is respectfully submitted that although Paulsen et al. describes the desirability of coplanarity, nothing in Paulsen et al. teaches or suggests the feature of claim 22 as claimed. In fact, Paulsen et al. implies that the coplanarity is determined only by comparing the z-dimension height of each ball in a BGA and the substrate with presumably a respective predetermined tolerance. (Col. 6, ll. 39-54). This is not the feature claimed by Applicant in claim 22.

It is further submitted that even if Paulsen et al. taught or suggested the feature of claim 22 and its dependent claims, there is no suggestion or motivation to include that feature in Mengel et al. The Examiner states that this would improve quality of the product and fix manufacturing problems. However, Applicant submit that Mengel et al. has as its purpose the extraction and testing of mounted components on a mounted board as well as soldered locations. (Pg. 2, ll. 26-32). Given the resulting wide variety of maximums, volumes, shape and inclination of surfaces, there is no teaching or suggestion that coplanarity is even an issue in Mengel et al. nor that a coplanarity value would provide any of the purported benefits conferred upon Paulsen et al. The only motivation to include the features of claim 22

impermissibly comes from Applicant's disclosure. Thus, in addition to the reasons stated with respect to claim 17, the invention of claim 22 is patentable over the prior art of record.

The Examiner rejects claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and further in view of Li (US 6,055,328). Claim 20 has been amended to clarify that the determining step further comprises the step of comparing the spheres to at least one template. Claim 20 depends from claims 17-19 and includes all the features therein. Thus, and as mentioned previously, the Examiner's proposed combination of Mengel et al., Paulsen et al. and Haugan et al. fails to teach or suggest all the features of claim 17, and particularly the step of claim 17 of processing the three dimensional image only at those addresses which correspond to two dimensional addresses characteristic of three dimensional features, to determine the altitude of those three dimensional features. The addition of Li fails to cure this deficiency in the combination since Li also fails to teach or suggest the processing step. Thus, claim 20 is allowable over the prior art of record.

In addition to the foregoing, it is respectfully submitted that the Examiner fails to make a *prima facie* case of obviousness of claim 20 on separate grounds. In particular, it is respectfully submitted that the Examiner has used Applicant's own disclosure to find a motivation to combine the references, not the references themselves. With respect to claim 19, from which claim 20 depends, the Examiner states that it would have been obvious to one skilled in the art to incorporate the method of Mengel et al. as modified by Paulsen et al. and Haugan et al. to add the spheres of Paulsen et al., since one would be motivated to make such a modification to inspect BGA arrays (col. 6, line 43) for improving quality of the product and fixing manufacturing problems (Abstract, lines 1-6) as implied from Paulsen et al. With respect to claim 20 itself, the Examiner states that it would have been obvious to further incorporate comparison of templates of Li, since one would be motivated to make such a modification to save time (col. 1, lines 30-35) as shown by Li. This reasoning is not supported by the references. Mengel et al. is a method of analyzing extracted image features in a highly accurate way where the image features of electronic mounted components and soldered locations, not spheres, on a

circuit board. To obtain better recognition certainty, additional processing steps are described. (Pg. 3, ll. 7-15, 29-33). Speed is not an issue in Mengel et al. due to the variety of objects with which it is concerned. Li, meanwhile, does not state that a golden template would save time in a comparing step. Instead, Li merely states that golden template sampling would be faster but less accurate than manual entry of expected data for a BGA. It is respectfully submitted that claim 20 is allowable over the prior art of record.

The Examiner rejects claims 23 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and further in view of Bilodeau et al. (US 5,465,152). The Examiner states that Bilodeau et al. teaches calculating a best fit plane by least squares or planes of repose, so it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the method of Mengel et al. as modified with the calculations of Bilodeau et al. to increase reliability of the inspection of ships for more reliable and robust connections (col. 1, ll. 13-15 and col. 2, ll. 5-10) as implied by Bilodeau et al. Claims 23 and 24 depend from claim 22 and ultimately from independent claim 17. It is submitted that, as discussed above, the combination of Mengel et al., Paulsen et al. and Haugan et al. fails to teach or suggest all the features of claim 17. In particular, that combination fails to teach or suggest the step of claim 17 of processing the three dimensional image only at those addresses which correspond to two dimensional addresses characteristic of three dimensional features, to determine the altitude of those three dimensional features. In addition, and as discussed above, there is no teaching or suggestion in that combination for the inclusion of the features of claim 22, namely wherein the IC package is rejected if the coplanarity value of a collection of three dimensional features is greater than a predetermined value, in Mengel et al. The inclusion of Bilodeau et al. fails to cure these deficiencies in the combination posed by the Examiner. Thus, claims 23 and 24 are also allowable over the prior art of record.

The Examiner rejects claim 25 and independent claim 30 and its dependent claims 31-32 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and further in view of Roy et al. (US 5,956,134). With respect to claim 25, which depends from claim 17, it is respectfully

submitted that the inclusion of Roy et al. in the Examiner's proposed combination of Mengel et al., Paulsen et al. and Haugan et al. fails to teach or suggest all the features of claim 17 as discussed above. In addition, it is respectfully submitted that the Examiner's proposed modification of the method of Mengel et al. is not desirable therein. Mengel et al. uses a two dimensional image to reject certain data points in extracting features from a three dimensional image. Mengel et al. does this by comparing data from the two dimensional image to data from the three dimensional image. At no time does Mengel et al. teach or suggest that it would more efficiently and expeditiously inspect semiconductor devices to add the step of comparing the two dimensional image against a two dimensional template. Roy et al. does not teach or suggest that the inclusion of such a step would more efficiently and expeditiously inspect semiconductor devices than any other method. Instead, Roy et al. describes only the efficiency of the overall process, which includes such a step as inspecting the placement of leads during a transfer process from one handling or holding structure to another. (Col. 2, ll. 46-58). It is respectfully submitted that claim 25 is allowable over the prior art of record.

With respect to independent claim 30 and its dependent claims 31-32, the Examiner has also failed to make a *prima facie* case of obviousness. As mentioned with respect to claim 17 and with respect to claim 25 above, the Examiner's proposed combination of Mengel et al., Paulsen et al., Haugan et al. and Roy et al. fails to teach or suggest all the steps of claim 30 and its dependent claims, particularly the step of processing the three dimensional image only at those addresses which correspond to two dimensional addresses characteristic of three dimensional features, to determine the altitude of those three dimensional features. In addition, and as discussed with respect to claim 25, the Examiner fails to make a *prima facie* case of obviousness because the cited combination fails to teach or suggest the step of comparing the two dimensional image against a two dimensional template and rejecting the quality of the IC package if the comparison reveals that the two dimensional image does not include three dimensional features in an expected configuration.

Finally, claim 30 and its dependent claims also include the step of processing the two dimensional image to identify a plurality of addresses which are

characteristic of three dimensional features. This feature is also included in claim 17.

The Examiner states that this feature is taught by Mengel et al., but the Examiner is incorrect. Mengel et al. does not need to perform such a step because the data obtained in the two dimensional and three dimensional images are obtained simultaneously. The two dimensional image is then processed to compare its data with the data from the three dimensional image for the same address. For the foregoing reasons, claim 30 and its dependent claims are allowable over the prior art of record.

In addition to the foregoing, and with respect to dependent claim 32, Applicant respectfully submits that the Examiner has failed to make a *prima facie* case of obviousness of this claim for the reasons set forth with respect to claim 22.

The Examiner rejects claim 26 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and further in view of Michael (US 5,640,200). The Examiner states that one would be motivated to modify the method of Mengel et al. as modified by Paulsen et al. and Haugan et al. to incorporate a gray scale image correlated against a template to process inspection faster and more accurately (col. 12, ll. 1-11) as implied from Michael. First, the addition of Michael fails to cure the failure of the combination of Mengel et al., Paulsen et al. and Haugan et al. to teach or suggest all the features of claim 17, from which claim 26 ultimately depends.

In addition, it is respectfully submitted that once again the Examiner has engaged in impermissible hindsight in proposing the combination. As mentioned with respect to claim 20, speed is not an issue in Mengel et al. due to the variety of objects with which it is concerned. Specifically, Mengel et al. is a method of analyzing extracted image features in a highly accurate way where the image features of electronic mounted components and soldered locations on a circuit board. (Pg. 3, ll. 7-15, 29-33). The Examiner's proposed modification of the method of Mengel et al. is not desirable therein. Mengel et al. uses a two dimensional image to reject certain data points in extracting features from a three dimensional image. Mengel et al. does this by comparing data from the two dimensional image to data from the three dimensional image. At no time does Mengel et al. teach or suggest that it would be faster and more accurate to add the step of comparing the two dimensional

image against a two dimensional template as described in claim 25 and to correlate the two dimensional image against the two dimensional template wherein the two dimensional image is a gray scale image as described in claim 26. Michael suggests that gray scale correlation is fast and accurate, but there is no indication that it would be fast or accurate in the method of Mengel et al. It is respectfully submitted that claim 26 is allowable over the prior art of record.

The Examiner rejects claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and further in view of Bartulovic et al. (US 6,177,682). The Examiner acknowledges that Mengel et al. does not disclose a pair of opposed light sources to obtain first and second three dimensional data to combine to obtain a three dimensional image. Stating that Bartulovic et al. teaches this feature, the Examiner posits that it would have been obvious to one having ordinary skill in the art to incorporate this feature in the method of Mengel et al. as modified by Paulsen et al. and Haugan et al. to obtain a more precise image for analysis. (Col. 2, ll. 38-46). It is respectfully submitted that even with the addition of Bartulovic et al. the recited combination fails to teach or suggest all the features of claim 17, from which claim 27 depends. In addition, it is respectfully submitted that the Examiner's purported motivation once again relies upon hindsight reconstruction of the claimed invention. Although Bartulovic et al. does state that multiple sources of illumination provide a more precise image with respect to BGA's by using shadow images of the solder balls, there is no teaching or suggestion that these multiple sources would convey any benefit at all to a method such as that described by Mengel et al., where the image features analyzed are both electronic mounted components and soldered locations on a circuit board. (Pg. 3, ll. 7-15, 29-33). Moreover, it is not clear from either Mengel et al. or Bartulovic et al. as to whether any such benefits would accrue where two dimensional images were also obtained for the comparison described by Mengel et al. Claim 27 is respectfully submitted to be allowable over the prior art of record.

The Examiner rejects claim 28 and independent claim 36 and its dependent claim 37 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and further in view of Michael et al. (US 5,978,080). With respect to claim 28, it is respectfully submitted that the

Examiner has failed to make a *prima facie* case of obviousness. Claim 28 depends from claim 17 and as discussed with respect to claim 17, the combination of Mengel et al., Paulsen et al. and Haugan et al. fails to teach or suggest all the features of claim 17. The addition of Michael et al. to the combination fails to cure the deficiencies because Michael et al. also fails to teach or suggest the features of claim 17 missing from the combination. Furthermore, Michael et al. does not teach or suggest the feature of claim 28 of determining a correspondence between the addresses in the two dimensional image and the addresses in the three dimensional image by calibrating to a machined fixture. Michael et al. does teach that it is beneficial in many machine vision applications to correlate physical coordinates to pixel coordinates. However, the example provided is irrelevant to any proposed combination of Mengel et al., Paulsen et al. and Haugan et al. because it describes repositioning of a stage during assembly of a circuit board on a motion stage. In Mengel et al. the two dimensional and three dimensional images are processed at each image point. No calibration to a machined fixture is needed. It is respectfully submitted that claim 28 is allowable over the prior art of record.

With respect to independent claim 36 and its dependent claim 37, the Examiner has also failed to make a *prima facie* case of obviousness. As mentioned with respect to claim 17, the Examiner's proposed combination of Mengel et al., Paulsen et al. and Haugan et al. fails to teach or suggest all the steps of the claim, particularly the step of processing the three dimensional image only at those addresses which correspond to two dimensional addresses characteristic of three dimensional features, to determine the altitude of those three dimensional features. Michael et al. fails to cure this deficiency as mentioned above with respect to claim 28. In addition, and as discussed with respect to claim 30, the Examiner also fails to make a *prima facie* case of obviousness because the cited combination fails to teach or suggest the step of processing the two dimensional image to identify a plurality of addresses which are characteristic of three dimensional features. Once again, the addition of Michael et al. in the proposed combination fails to render the claim obvious because Michael et al. also fails to teach or suggest this feature. Finally, the proposed combination fails to teach or suggest the feature of claim 36 of determining a correspondence between the addresses in the two dimensional image and the

addresses in the three dimensional image by calibrating to a machined fixture as described above with respect to claim 28. For the foregoing reasons, claim 36 and its dependent claims are allowable over the prior art of record.

The Examiner rejects claim 29 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Michael et al. as applied to claim 28 and further in view of Williams (US 4,801,207).

The Examiner acknowledges that the combination of Mengel et al., Paulsen et al., Haugan et al. and Michael et al. fails to teach or suggest the features of claim 29, but states that Williams teaches transforming to reduce geometric distortion. The Examiner further states that it would have been obvious to add Williams to this combination to reduce distortion (col. 14, ll. 30-45) as implied from Williams for better images. As mentioned previously with respect to claim 28, the combination of Mengel et al., Paulsen et al., Haugan et al. and Michael et al. fails to teach or suggest all the features of claims 28 and 17, from which claim 29 depends. It is respectfully submitted that the only motivation for the Examiner to combine these references with Williams et al. is impermissible hindsight reconstruction. The addition of Williams does not cure the deficiencies described above with respect to the combination of Mengel et al., Paulsen et al., Haugan et al. and Michael et al. It is further submitted that the combination, as proposed, does not need to include the step transforming the three dimensional image to remove geometric distortion. In Mengel et al., the method of using the two dimensional image to check the three dimensional image is intended to remove any spurious three dimensional data. Moreover, Williams relates to a method of and apparatus for providing information as to the cross-sectional shape or the profile of a body (such as steel bars, railway wheels and ceramic, plastic or wooden objects). Nothing in Williams indicates that it would work in the environment of Mengel et al. It is respectfully submitted that claim 29 is allowable over the prior art of record.

The Examiner rejects claim 33 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Roy et al. as applied to claim 30 and further in view of Bartulovic et al. As the Examiner argued with respect to claim 27, the Examiner again states that Bartulovic et al. teaches a pair of opposed lasers are used to obtain a first and second three

dimensional image and the first and second three dimensional images are combined to obtain the three dimensional image and that it would have been obvious to one having ordinary skill in the art to incorporate this feature in the method of Mengel et al. as modified to obtain a more precise image for analysis. (Col. 2, ll. 38-46). It is respectfully submitted that claim 33 is allowable over the prior art of record for the reasons set forth with respect to claim 30, from which it depends. In addition, claim 33 is allowable for the reason set forth in more detail with respect to claim 27, namely that there is no motivation in the prior art to make the proposed combination.

The Examiner rejects claim 34 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Roy et al. as applied to claim 30 and further in view of Michael et al. Claim 34 is respectfully submitted to be allowable over the prior art of record based upon its dependence from claim 30. In addition, claim 34 is allowable for the reasons set forth in more detail with respect to claim 28.

The Examiner rejects claim 35 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Michael et al. as applied to claim 34 and further in view of Williams. Claim 35 is respectfully submitted to be allowable over the prior art of record based upon its dependence from claims 30 and 34. In addition, claim 35 is allowable for the reasons set forth in more detail with respect to claim 29.

The Examiner rejects claim 38 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Michael et al. as applied to claim 37 and further in view of Roy et al. It is respectfully submitted that claim 38 is allowable based upon its dependence from claim 36. Claim 38 is also allowable based upon the additional reasons recited with respect to claim 25.


The Examiner rejects claim 39 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Michael et al. and Roy et al. as applied to claim 38 and further in view of Michael. Claim 39 is respectfully submitted to be allowable over the prior art of record based upon its dependence from claims 36-38. In addition, claim 38 is allowable for the reasons set forth in more detail with respect to claim 26.

The Examiner rejects claim 40 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Michael et al. and Roy et al. and Michael as applied to claim 39 and further in view of Bartulovic et al. Claim 40 is respectfully submitted to be allowable over the prior art of record based upon its dependence from claims 36-39. In addition, claim 40 is allowable for the reasons set forth in more detail with respect to claim 27.

The Examiner rejects claim 41 under 35 U.S.C. § 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. and Michael et al. and Roy et al. and Michael and Bartulovic et al. as applied to claim 40 and further in view of Williams. Claim 41 is respectfully submitted to be allowable over the prior art of record based upon its dependence from claims 36-40. In addition, claim 41 is allowable for the reasons set forth in more detail with respect to claim 29.

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the application as originally filed. It is further submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Reconsideration of the application as amended is requested. It is respectfully submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the present application can be expedited by way of an Examiner's amendment, the Examiner is invited to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,
YOUNG & BASILE, P.C.

Michelle L. Knight
Attorney for Applicant
Registration No. 47711
(248) 649-3333

3001 West Big Beaver Rd., Suite 624
Troy, Michigan 48084-3107
Dated: May 31, 2005